SCIENCE

FRIDAY, AUGUST 16, 1918

CONTENTS

MSS. intended for publication and books, etc., intended for review should be sent to The Editor of Science, Garrison-on-Hudson, N. Y.

GROVE KARL GILBERT[1]

GROVE KARL GILBERT was one of the most eminent geologists of the world. As he was a native of Rochester and an honorary member of this society, the Academy of Science has special pride in his life and work.

Dr. Gilbert was born in Rochester, May 6, 1843. His father was the well-known portrait painter, Grove Sheldon Gilbert. For many years the family lived in the little house at the intersection of Culver Road and Merchants Road, but Karl was not born there. He had six brothers and sisters. The usual want of thrift and acquisitiveness in men of the artistic temperament held in the case of the father, and it appears that the family was poor and that Karl had to obtain some help for his course in college. He graduated as Bachelor of Arts at the university in 1862.

Following his graduation he taught for one year as principal of the schools in Jackson, Mich. He then returned to Rochester and until 1868 was assistant to Henry A. Ward. This work on the geologic and zoologic material of Ward's establishment probably determined his future scientific career. Many thousands of the labels in the University Geological Museum, which was the famous Ward collection, carry the pen-work of young Gilbert.

In 1869 he began, on the Ohio Geological Survey, under Professor J. S. Newberry, his geologic work. That this work was deliberate choice appears from the "Historical Sketch" by Newberry, in the report for 1869 (page 9), where we read:

Of the other members of the corps, Messrs. Gilbert and Sherwood were geologists who had devoted much time to practical geology in New York and Pennsylvania, and who, for the purpose of adding to their experience, volunteered their serv-

[1] Memoir presented to the Rochester Academy of Science.

ices for no other compensation than their traveling expenses.

In the report for 1870 Dr. Newberry writes:

> The fossil fishes and fossil plants found in the state have been described by myself. They have been drawn by Mr. T. Y. Gardner and Mr. G. K. Gilbert in a style that has not been surpassed in this country, and some of their work is equal to any of a similar character done by the best European draughtsmen (page 8).

This volume contains a short report by Gilbert on three counties in the northwestern part of the state.[2] A fuller report on the same district is attached to a report on the surface geology of the Maumee Valley, found in Volume 1, of the final reports of the Newberry survey. This writing, published in 1873, contains six maps, evidently all his own work. The first two maps show the beaches of the ancient glacial waters in the Maumee Valley, and the correlation of the highest shore with the pass at Fort Wayne.

These fine maps are the first ever made in delineation of ancient lake beaches and correlation with the controlling outlet. The field work for this report was done in 1869 and 1870, when he was only twenty-seven years of age. At this time Gilbert did not recognize the receding ice sheet as the dam that held up the ancient waters, but he did clearly postulate deformation of the earth's surface as one cause of the variation of levels. He says (page 551):

> The more general conclusion that the system of raised beaches signify a succession of flexures of the earth's surface, rather than successive stages of subsidence due to the gradual removal of a barrier of tide water, or the gradual wear of a barrier of stone, does not rest on this single fact.

Even then he knew something of the change of levels in the Ontario basin, for he immediately says, in citing other similar facts: "There is evidence that Lake Ontario, at Rochester, N. Y., has stood 70 feet lower than it does now" (page 552). Some sentences in the same connection illustrate his capacity for generalization.

> While these facts abundantly prove that a simple theory of gradual drainage, by the elevation en masse of the lake regions, is entirely inadequate, they are too fragmentary to define clearly the general synchronism and sequence of the local movements to which they testify. Nevertheless, it is something to have learned that the writhing of the surface of the earth, which has in the ages so many times remapped the continents, has also been the great immediate cause of the transformations of the great lakes, and that, continuing through the latest distinguishable geological epoch and its prolongation the historical, it has now ceased.

Dr. Newberry was the first geologist to recognize the ice barrier as the cause of the high-level waters in the Laurentian basin, and it is interesting to find a footnote over his initials, at the bottom of the same page (552), reading as follows:

> In the discussion of these facts cited by Mr. Gilbert, and others of similar character, it should be remembered that the retreating glacier must have, for ages, constituted an ice dam that obstructed the natural lines of drainage, and may have maintained a high surface level in the water-basin which succeeded it.

The substance of Gilbert's report in the 1873 volume of the Ohio Survey had previous publication by permission in the *American Journal of Science* in 1871.[3] An abstract was also printed in the proceedings of the New York Academy of Sciences of February 20, 1871 (pp. 175–178).

In 1871 Gilbert joined the Wheeler survey of the western territories and began the many years of work in the far west. From 1875 he was on the survey under Major Powell. The United States Geological survey was organized in 1879, with Clarence King as director, and young Gilbert became a member. From that time to his death, May 1, 1918, he was continuously on the national survey.

Gilbert was not a prolific writer, as compared with others and judged by his work and ability. Down to 1891 the bibliographic list carries 70 titles, four of which have associated authors. His initial publication, in recognized geologic mediums, was in 1871, on the Cohoes mastodon in the twenty-first annual report of

[2] Part VII., pp. 485–499.

[3] Vol. 1 of third series, pp. 339–345.

the New York State Cabinet of Natural History. His next three articles have been noted above, relating to Ohio geology and the ancient beaches. From 1871 his papers are mostly in description of features of the western country. The most important of his earlier papers is the report on the Henry Mountains, published 1877. In this classic paper he described a new type of mountains, now fully recognized. These were originally domes, or areas of sedimentary strata lifted by the injection of lava from beneath. Quoting his own description, page 19:

> The lava of the Henry Mountains behaved differently. Instead of rising through all the beds of the earth's crust, it stopped at a lower horizon, insinuated itself between two strata, and opened for itself a chamber by lifting all the superior beds. In this chamber it congealed, forming a massive body of trap. For this body the name laccolite (cistern-stone) will be used.

In later years the name has been changed to laccolith. Subsequent erosion of these uplifts by doming has often destroyed the arching form or obscured the primitive shape and exposed the injected igneous heart. The latter part of this book is a discussion of land sculpture. In this statement of the principles of erosion and the origin of topographic forms he shares with Newberry and Powell the honor of a pioneer.

Probably his most famous writing is the work on Lake Bonneville. This is the initial volume of the series of quarto monographs published by the National Survey, and bears the date 1890. This describes the wide expanded predecessor of the present Great Salt Lake, which existed in glacial time when humidity and rainfall of the Great Basin produced the vast lake which overflowed northward to the Columbia River. Great Salt Lake is only the saline remnant of that desiccated fresh-water body.

This handsome quarto volume contains a chapter on "Topographic Features of Lake Shores" which is the classic writing on shoreline topography.

It is interesting to note that he published no articles relating to the Rochester region until after his long period of western exploration. His first publication in reference to the Ontario basin was in 1885, on the Iroquois shoreline; although he then called it simply the old shore-line of Ontario. Between then and 1891 he published six papers on the Pleistocene features or glacial history of the Ontario basin; and one on the sink ridges near Caledonia.

From 1892 to 1900, eight years, his list of writings is forty; covering a wide range of subjects in geology. Of these eight related to western New York. From 1901 to 1905 twenty-five titles are on record, of which only two concern western New York. During 1906 and 1907 he published nine articles, one being on Niagara. In 1908 only four articles, including another on Niagara, are recorded in the bibliography. Since 1908 only five titles are credited. Altogether this makes 156 titles, of which 18 relate to the geology of western New York or the Ontario basin.

The few papers published in later years is explained by his poor health, due to a slight stroke of apoplexy. After this time by very careful living he was able to do some work in a deliberate way. His latest study was the transportation of detritus by streams, with reference to hydraulic mining in California. This work, spread over several years, was published last year, being his last publication. It is entitled "Hydraulic-mining Debris in the Sierra Nevada," and is Professional Paper 105 of the Survey list, forming a quarto of 154 pages, with numerous maps and reproduction of photographs.

Dr. Gilbert's only writing for school textbooks in his "Introduction to Physical Geography," in collaboration with Professor A. P. Brigham. This was published in 1892 by D. Appleton and Company.

Geology is so broad and comprehensive and so inviting in many directions that some men with active minds and lively interest scatter their studies over diverse fields. Dr. Gilbert more wisely confined his work to physical geology, especially geodynamics, in which he was recognized as a master. He published practically nothing in biologic geology or paleontology; and almost nothing in stratigraphy and petrology.

His geologic interest in his home region was mainly in glacial problems, especially the glacial lake Iroquois and the deformation of the Ontario basin. He was the first geologist to appreciate the complexity of the Pleistocene history of the valley. As early as 1885 he recognized the three controlling factors: (*a*) the damming effect of the waning glacier and the glacial nature of the earlier waters; (*b*) the succession of water levels due to opening of different outlets or places of escape for the impounded waters, by the recession of the glacier front; and (*c*) the dislocation and canting of the water planes by the tilting uplift of the land. His accurate conclusions regarding the complex history are embodied in a number of short papers, and especially in a chapter in the "Sixth Annual Report of the Commissioners of the State Reservation at Niagara for the year 1890." The title of this important but little-known paper is "The History of Niagara."

Dr. Gilbert's mind was of the reflective, philosophic type. He sought for the explanation and relationship of phenomena. His calm judgment and clear discrimination joined to a spirit of fairness and with gentle manners caused him to be much sought as a critic and helper. He was a sort of father-adviser to the members of the survey. Doubtless much of his thought has found expression in the writings of the younger men who revered and loved him. The writer of this appreciation never heard him say a harsh word of any one. He was reserved in personal matters, but it is known that the death of a young daughter affected and saddened his life. His wife, who was Fannie L. Porter, died over twenty years ago. Two sons are living.

Dr. Gilbert received many honors. The University of Rochester gave him the master's degree in 1872, and the LL.D. degree in 1898. The latter degree was also conferred by the University of Wisconsin. He was the fourth president of the Geological Society of America, in 1892, and was again president in 1909, the only man honored by a second term. In 1899 he was president of the American Association for the Advancement of Science, probably the highest honor in the gift of American science. Naturally he was active and prominent in the scientific societies of the national capitol, and was a member of the National Academy of Sciences. He was one of the very few honorary members of this society. In 1892, when the American Association for the Advancement of Science held its annual meeting in Rochester, this academy held a special meeting in Music Hall complimentary to the association, and the lecture of the evening was given by Gilbert, the subject being: "Coon Butte and the Theories of Its Origin." The relief map which he used on that occasion was donated to the university museum. It may be said that this was one of the very few times in which his theory has been proven wrong.

On the approach of his seventy-fifth anniversary, the sixth of last May, his friends were asked to send to the Survey letters of appreciation to be handed to him on that day. Unhappily he passed away on the first of the month at Jackson, Mich.

HERMAN LEROY FAIRCHILD

WAR BREAD

DR. ALONZO E. TAYLOR in his book "War Bread" gives a large amount of valuable information concerning the conservation of wheat under war conditions. Our duty is plainly set forth and many helpful suggestions are made.

There are two topics discussed in this book, "Food Value of the Different Grains," and "Ways of Stretching Wheat," which are of particular interest to the student of nutrition. Briefly stated, Dr. Taylor's conclusions are that the direct substitution of other cereals for wheat, and the judicious use of mixed flours, are the best ways of conserving wheat. Long extraction flours milled so as to include the germ or bran have not proved satisfactory for the making of war bread. A few quotations will perhaps best serve to give the author's conclusions upon these points.

Direct substitution offers the most obvious way of saving wheat (p. 62).

The best mixed-flour bread is prepared from flour of standard extraction. For practical pur-